

Revisional treatment of the Mexican species of Seymeria (Schrophulariaceae). B. L. Turner, Dept. Botany, Univ. of Texas, Austin 78712

Abstract

The Mexican species of Seymeria, a genus of annual and perennial herbs restricted to the southeastern United States and adjacent Mexico, is treated taxonomically. The only previous account of the genus was that of Pennell (1925) who recognized 22 species, 19 of these largely confined to Mexico. I recognize only 15 species in the genus: 3 largely confined to the United States and 12 mostly confined to Mexico. Ten of the species recognized by Pennell have been reduced to synonymy and three new specific taxa have been erected (S. falcata Turner; S. pennellii Turner; and S. tamaulipana Turner). Distributional maps for the Mexican species have been presented along with a nearly complete account of the synonymy and typification for each.

The genus Seymeria was treated in its entirety by the late F. W. Pennell (as Afzelia) in 1925. He recognized 22 species in the genus, all but three of these, S. cassioides (Walt.) Blake, S. texana (Gray) Standl., and S. pectiuata Pursh largely confined to Mexico.

My interest in the group has been purely fortuitous, resulting largely from the decision of a graduate student at the University of Texas, Austin, Mr. John Williams to opt out of a Ph.D. program. To become familiar with his thesis problem he borrowed specimens from GH, PH and US. Before leaving the University Mr. Williams annotated material from the eastern United States but left untouched the 20 "species" recognized by Pennell as occurring in western Texas and adjacent Mexico. Before returning the material to the institutions concerned I felt some compulsion to attempt to tidy up the nomenclature concerned and provide meaningful annotations for the remaining material. It soon became obvious that this was not an easy task, but it proved interesting and I persevered, borrowing material from UC during the latter stages of the study.

My interest in scrophs is minimal and is likely to remain so. Thus, I do not contemplate undertaking the considerable field work that will be needed to provide a definitive treatment to the genus. Suffice to say, it is sorely needed. Consequently my treatment here, hoping some younger, stronger soul, will be stimulated to occupy their time with this fascinating group.

Clearly Pennell was intrigued with the taxon, entitling his research on the genus as " a taxonomic study in evolution."

Considering the limited material available to Pennell and the prevailing concepts of that day, his treatment is admirable, at least as to effort. That he never completed a subsequent revisionary treatment is curious, since he spent considerable effort in Mexico collecting the species, some of them quite fragmentary (out of season) and presumably mostly identified according to his 1925 key. Perhaps it was this reliance on the "past" that precluded any new evaluation: surely he would have to sink many of his originally proposed species as new knowledge of populational variability was revealed.

In any case, I have not been able to use his 1925 treatment with any consistent degree of success and have felt it necessary to start from scratch in the treatment presented here. I am aware that much additional work is needed and only hope that the hypothetical taxa created here serve as a guide to yet some better, more experimental, account.

I am grateful to Dr. M. C. Johnston for the Latin diagnoses.

Convenient Key to Mexican Species of *Seymeria*

1. Perennials with branched root systems (not known for *S. deflexa*, which is keyed an annual) 2
1. Annuals with simple tap roots 5
 2. Corollas glabrous externally 3
 2. Corollas always with at least a few hairs or sessile glands externally 4
3. Calyx lobes 2-3 times as long as the cup; leaves deeply bipinnatisect 5. *S. pennellii*
3. Calyx lobes 1-2 times as long as the cup; leaves merely lobed or remotely pinnatisect . . . 3. *S. tamaulipana*
4. Corolla 6-9 mm long; flowering pedicels mostly 5-12 mm long 1. *S. virgata*
4. Corolla 10-16 mm long; flowering pedicels mostly 10-16 mm long 2. *S. decurva*
5. Capsule glabrous 6
5. Capsule variously pubescent or atomiferous-glandular 7
6. Calyx tube 1.0-1.5 mm long; corolla 6-7(8) mm long; capsules mostly symmetric . . 6. *S. integrifolia*

6. Calyx tube 1.5-3.0 mm long; corolla 7-9 mm long; capsules mostly asymmetric (semi-falcate)
 7. *S. falcata*
7. Capsule with sessile capitate glands (appearing glandular-atomiferous); foliage deeply bipinnatisect, glabrous or nearly so 8. *S. laciniata*
7. Capsule variously pubescent but not with sessile glands; foliage various, but rarely both bipinnatisect and glabrous 8
8. Corolla glabrous externally 9
8. Corolla with at least a few hairs or glandular-trichomes externally 11
9. Leaves not pinnatisect, variously irregularly serrate or lobed, the lobes 2-5 mm broad . . 4. *S. deflexa*
9. Leaves deeply pinnatisect, the lobes linear, 1 mm or less broad 10
10. Calyx, pedicels and (usually) foliage beset with short, stipitate trichomes only; leaves mostly pinnatisect 9. *S. scabra*
10. Calyx, pedicels and foliage beset with multiseptate, glandular-trichomes, these usually interspersed with non-glandular hairs; leaves mostly bipinnatisect 10. *S. coahuilana*
11. Corollas 6-7(8) mm long, very sparsely pubescent, the lobes narrow, twice as long as wide; capsules mostly 7-8 mm long 11. *S. sinaloana*
11. Corollas (7)8-12 mm long, prominently pubescent (rarely not so), the lobes broad, scarcely as long as broad; capsules mostly 8-12 mm long . . . 12. *S. bipinnatisecta*

1. *Seymeria virgata* (H.B.K.) Benth. ex DC., Prod. 10:511. 1846.
Gerardia virgata H.B.K., Nov. Gen. Spec. 2:344. 1818.
 TYPE: MEXICO. Guanajuato: Villalpando, between Guanajuato and Santa Rosa, Sep 1818, Humboldt & Bonpland s.n. (holotype P).
- Afzelia virgata* (H.B.K.) Ktze., Rev. Gen. 1:457. 1891.
Afzelia ramosissima Pennell, Proc. Acad. Phila. 77: 357. 1925.
 TYPE: MEXICO. Jalisco: W of Bolanos, 16 Sep 1897, J. N. Rose 3708. (holotype US!; isotype PH!).
Seymeria ramosissima (Pennell) Standley, Field Mus. Pub. Bot. 11:175. 1936.

DESCRIPTION: About the same as that rendered by Pennell except that I would include in this the somewhat larger-flowered (9-10 mm long) plants with less pubescent staminal filaments from Jalisco which Pennell segregated as S. ramosissima.

DISTRIBUTION (Fig. 1): Northcentral Mexico in mountainous areas from 1900-2700 m in mostly open calcareous or gypseous soils dominated by dense stands of oak, pine and various chaparral-type shrubs. Flowering: Jul-Oct.

Selected significant collections since Pennell's treatment: COAHUILA: Cerro San Pedro, ca. 50 m from summit on W side ($24^{\circ}44'30''N$ x $100^{\circ}45'W$), 22-23 Jul 1977, Wells & Nesom 133 (LL).

Seymeria virgata is an exceedingly variable taxon, especially in leaf shape which varies from nearly entire (Turner & Davies A-29, TEX) to deeply pinnatifid or dissected (Rzedowski 4353, TEX). It is very similar to S. decurva, but the latter has much larger flowers. Since these two taxa are largely allopatric, S. virgata occupying mostly calcareous or gypseous soils of northcentral Mexico and S. decurva occupying mostly igneous soils of central Mexico, I have maintained the taxa as species. Additional field work might show that the taxa intergrade over the region of contact; indeed the type of S. latiflora (cf. S. decurva) from near San Luis Potosi may be such an individual. Occasional hybrids between S. virgata and S. decurva might also be expected in this region.

In the area of Galeana, Nuevo Leon, Seymeria virgata and S. tamaulipana occur in close proximity, the latter being a largely allopatric element to the east of the former. Occasional hybrids might occur between these, although mixed collections from the same site have not been noted in the present study.

2. Seymeria decurva Benth. ex DC., Prod. 10:512. 1846.

TYPE: MEXICO. Mexico State (?): w/o locality, 1830, G. J. Graham s.n. (G).

Gerardia virgata Benth., Comp. Bot. Mag. 1:205. 1835. non G. virgata H.B.K.

Seymeria pinnatifida Hems1., Biol. Cent. Amer. Bot. 2:458. 1882. MEXICO. Hidalgo: Zimapan, 1827, Coulter 1281 (holotype K; isotype GH!).

Afzelia pinnatifida (Hems1.) Ktze., Rev. Gen. 1:457. 1891.

Afzelia decurva (Benth. ex DC.) Ktze., Rev. Gen. 1:457. 1891.

Afzelia madagascariensis Ktze., Rev. Gen. 1:
457. 1891. (as noted by Pennell, the type, said to be from Madagascar, is surely erroneous).

Afzelia latiflora Pennell, Proc. Acad. Phila. 77:355. 1925. TYPE: MEXICO. San Luis Potosi: region of San Luis Potosi, (July) 1878, Parry & Palmer 683. (holotype, PH; isotype US!).

Afzelia laxa Pennell, Proc. Acad. Phila. 77: 355. 1925. TYPE: MEXICO. w/o locality, 1848-49, Gregg 410. (holotype GH!).

Afzelia stricta Pennell, Proc. Acad. Phila. 77: 358. 1925. TYPE: MEXICO. Puebla: Coxcatlan. Sep 1909, C. A. Purpus 4164. (holotype US!; isotypes PH!; UC!).

Seymeria latiflora (Pennell) Standley, Field Mus. Pub. Bot. 11:175. 1936.

Seymeria laxa (Pennell) Standley, Field Mus. Pub. Bot. 11:175. 1936.

Seymeria stricta (Pennell) Standley, Field Mus. Pub. Bot. 11:175. 1936.

DESCRIPTION: About as rendered by Pennell, but including the variation attributed to the several novelties concocted by him and listed in the above synonymy.

DISTRIBUTION (Fig. 1): Central Mexico mostly in igneous soils from southernmost Coahuila to Oaxaca where it occurs at mid-elevations in oak and juniper woodlands. Flowering Jul-Oct.

Additional significant collections since Pennell's treatment include the following: COAHUILA. 24 km NW of Fraile (25°3'Nx101°18'W), 2900 m, 15 Jul 1941, Stanford et al. 404 (GH, UC). OAXACA. vicinity of San Luis Tliltlanapa, "Cerro Verde", Jul 1908, C. A. Purpus 3264 (UC).

As treated here Seymeria decurva is a wide-ranging, highly variable, species which is largely confined to igneous soils of southcentral Mexico. It is most closely related to S. virgata, a largely allopatric taxon of northcentral Mexico which is mostly confined to calcareous or gypseous soils. The latter has generally smaller corollas (6-10 mm) and perhaps a more robust habit, to judge from dried material.

Of the segregates proposed by Pennell, Seymeria stricta from the Tehuacan area of Puebla state is perhaps the most distinctive, possessing relatively small, narrow corollas, and a rather consistent retrose pubescence on the pedicels and with spreading hairs in the calyx sinuses. Additional field work in this area may show the populations concerned to be worthy of recognition; if not at the species level, perhaps at the varietal level. Recent

collection in this area by Smith et al. (3826, GH, US) note the plants concerned to occur in pine-oak forests from 2000-2500 m.

Seymeria laxa is based upon a Gregg specimen (410); however, Pennell cited one additional sheet (Coulter 1280) which was apparently collected in the state of Hidalgo (Zimapan) to judge from Coulter 1281, the type of S. pinnatifida. I was unable to distinguish the admittedly sparse material of either of these taxa from that of S. decurva.

Seymeria decurva normally has pinnatisect leaves, but individuals with merely lobed leaves, approaching those of S. tamaulipana are found in northeastern Hidalgo (e.g., Moore 1872, GH).

3. Seymeria tamaulipana B. L. Turner, sp. nov.

TYPE: MEXICO. Tamaulipas: Sierra de Tamaulipas, region of Rancho Las Yucas, ca. 40 km NNW of Aldama, (ca. 23°14'Nx98°10'W), "EL Pinoso," in pine-oak forest. 14 Oct 1957, Robert L. Dressler 2409. (holotype GH!; isotype UC!).

S. virgata accends sed corollis glabris, capsulis fere glabris, foliis integris vel remote pinnatisectis.

Perennial herb up to 1 m tall. Stems glabrate, minutely puberulous, or puberulous intermixed with short glandular trichomes. Leaves highly variable, linear-lanceolate and entire to ovate and irregularly lobed, to remotely and deeply once-pinnatisect. "Flowers yellow, basally reddish without" (Dressler 1972); pedicels mostly 6-12 mm long, glabrate to puberulous, or puberulent intermixed with short glandular trichomes. Calyx 5-6 mm long, sparsely puberulent throughout or puberulent intermixed with short glandular trichomes; lobes 5, entire, 1.5-2.5 mm long. Corolla 8-10 mm long, deflexed in the manner of S. virgata, glabrous externally; tube 1.0-1.5 mm long, the throat abruptly flaring, 6-8 mm long, 7-10 mm across; lobes shorter than the throat, broadly rounded and ciliate, the posterior pair united for 4/5 their length, densely pubescent internally just below the notch. Stamens 4-5 mm long; filaments 1.5-2.2 mm long, broadened and densely long-pubescent for ca 4/5 their length; anthers glabrous, 2.5-3.1 mm long, opening throughout their length. Style relatively stout, up to 7 mm long, with well-developed stigmatic knob. Capsule symmetrical, broadly ovate, 8-10 mm long, glabrous or with a few scattered stipitate glands on the lower portion; seeds brown, ca 1.3 mm long, testa reticulate, extending into

pronounced thin wings.

DISTRIBUTION (Fig. 1): Oak-pine forests and lower stream sides in northcentral Mexico mostly along the slopes of the Sierra Madre Oriental. Flowering: Jul-Nov.

Additional specimens examined: NUEVO LEON. Dist. Linares: below Ebanito, 890 m, 1 Nov 1979, Hinton 17706 (TEX). TAMAULIPAS. Sierra de San Carlos, vicinity of Marmolejo, Pica del Diablo, 12 Aug 1930, Bartlett 10920 (US); Sierra de Tamaulipas, ca. 40 km NNW of Aldama, highest point in Sierra, W of Las Yucas in low oak scrub, 23 Jul 1957, Dressler 1972 (GH); between Hermosa and Miquihuana, 23 Jul 1949, Stanford et al. 2689 (GH, PH); Cerro Pena Nevada, ca. 12 km NE San Antonio, Jul 1977, Wells & Nesom 312 (LL).

Seymeria tamaulipana is clearly related to *S. decurva* and *S. virgata*, differing from both in possessing glabrous corollas and essentially glabrous fruits (rarely a few trichomes). In addition the leaves of *S. tamaulipana* are distinctly less pinnatisect and mostly without glandular trichomes.

The type of *S. tamaulipana* has a few trichomes along the base of the immature capsules as well as glandular trichomes on the calyx and pedicels. Pubescence is apparently quite variable within the vicinity of the type locality since Dressler 1972 has nearly glabrous capsules and only a few glandular trichomes on the calyx and pedicels. To the northwest the populations become essentially glandular and the fruits are glabrous throughout (e.g., Hinton 17706, TEX).

The leaves of *S. tamaulipana* are especially variable as noted in the description. Pennell, by annotations, identified some of the specimens cited above as either *S. decurva* or *S. latiflora*, although he noted the Bartlett collection (10920) as perhaps being an undescribed species.

Finally, it should be noted that two specimens (one sterile and the other in fruit from the previous growing season; Pennell 17728 and 17522 respectively, both at GH) from the state of San Luis Potosi might represent this species (to judge from their linear, entire, glabrous leaves), but the material is inadequate for specific identification.

4. *Seymeria deflexa* Eastw., Proc. Amer. Acad. Arts Sci. 44: 607. 1909.

TYPE: MEXICO. Neuvo Leon: limestone ledges above Monterrey, 3000 ft, 19 Sep 1907, C. G. Pringle 10398. (holotype GH!; isotypes LL!. PH!, TEX!, US!)

Afzelia deflexa (Eastw.) Pennell, Proc. Acad. Phil. 77:365. 1925.

DESCRIPTION: as rendered by Pennell (1925) except that the plant appears to be perennial, to judge from the fact that the stems from several of the cited specimens are decidedly suffrutescent. None of the collections has roots. Mature fruits are, as yet, unknown.

DISTRIBUTION (Fig. 1): Known only from the type locality and vicinity where it occurs in limestone soils on the lower slopes of the eastern-facing Sierra Madre Oriental. Flowering: Jul-Sep.

SPECIMENS EXAMINED: NUEVO LEON. Monterrey, 15 Jul 1933, C. J. & M. T. Mueller 126 (TEX); above Olinala below "M" pinnacles, Monterrey, Sep 1960, Smith M409 (TEX).

Pennell positioned the species in the annual groups, section *Pectinatae*, as the sole member of the subsection *Deflexae*. Fruit, seed characters and glabrous corollas appear to align the species with *A. bipinnatisecta* of the annual subsection *Bipinnatisectae*. As noted above, the species is possibly perennial.

5. *Seymeria pennellii* B. L. Turner, sp. nov.

S. decurva *accedens* sed valde distincta corollis extus glabris tenuibus fere erectis, intus infra fissuram dorsalem glabris, lobis calycis elongatis 7--9 mm longis (versus 3--6 mm).

TYPE: MEXICO. Durango: Metates, N of Cueva, rich slopes in pineland, 2600-2700 m, 29-30 Aug 1934, F. W. Pennell 18433. (holotype US!; isotypes GH!, UC!).

Seymeria pennellii, because of its deeply bipinnatisect leaves, superficially resembles *S. bipinnatisecta* but the perennial habit and completely dehiscent anthers seemingly place the taxon with the perennials of Pennell's Section *Virgatae*. Nevertheless relationships with the annual species, especially *S. laciniata* and *S. falcata*, seem to be real and it would appear, on cladistic grounds, that the latter taxa arose out of prototypes not too dissimilar from *S. pennellii*.

The species is named for the late Dr. Pennell whose interest and contributions to the Scrophulariaceae are well known. It is noteworthy, perhaps, that Pennell collected the type material in 1934, some 9 years after his germinal study. He identified these as *S. ramosissima* (which I have relegated to synonymy under *S. virgata*). The plant will not key in his original treatment and differs in so many characters from the other members of the *Virgatae* group that one must assume that Pennell provided a provisional name only perhaps recognizing the need to revise the genus. Unfortunately (or fortunately) he never

got around to the task.

Within the annual groups, *S. pennellii* would clearly be placed next to *S. laciniata* of Pennell's monotypic subsection *Laciniata*, which is characterized, in part by being glabrous below the dorsal lobes, the latter united for 3/5-4/5 their lengths, characters which also hold for *S. pennellii*.

6. *Seymeria integrifolia* Greenm., Proc. Amer. Acad. Arts Sci. 39:89. 1903.

TYPE: MEXICO. Jalisco: rocky hills near Guadalajara, 13 May 1901, C. G. Pringle 9660 (holotype, GH!).

Afzelia integrifolia (Greenm.) Pennell, Proc. Acad. Phila. 77:361. 1925.

Afzelia madrensis Pennell, Proc. Acad. Phila. 77:362. 1925. TYPE: MEXICO. Nayarit (?): northeast of Tepic, 1849, Seemann 2106 (holotype K; isotype GH!; isotype fragment, PH!). According to Seemann's account in the Botany of the Voyage of the Herald, he travelled from Mazatlan to the City of Durango, then southward through Nayarit to near Tepic. He presumably collected his 2106 in the mountainous areas northeast of the latter city. The only other known collection of *Seymeria* on this inland trip was that of *S. bipinnatisecta* (No. 2102) which was collected in Durango, presumably near El Salto.

Seymeria madrensis (Pennell) Standl., Field Mus. Publ. Bot. 11:175. 1936.

DESCRIPTION: as provided by Pennell except that the characters which he used to distinguish between *S. madrensis* and *S. integrifolia* should be included within the range of the latter. In short the only significant character mentioned appears to be that of leaf dissection, *S. integrifolia* being distinguished by its nearly entire leaves. However, this is a very inconstant feature and is found to vary in almost every species of *Seymeria* for which there is a range of material available. Further, the type of *S. integrifolia* and specimens cited by Pennell are mostly taken from the uppermost stems; the lower, primary leaves are notably absent. In any case, I cannot distinguish among the collections cited by Pennell in these taxa.

DISTRIBUTION (Fig. 2): Known only from Jalisco and adjacent Nayarit where it reportedly occurs in dry rocky soils. Flowering: May-Dec. There have been no recent collections of the taxon but additional plants are sure to become known as the area east of Tepic becomes better explored.

Seymeria integrifolia is probably closest to S. falcata. This is especially apparant in fruit structure, for both possess glabrous fruits; indeed collections of S. integrifolia (Pringle 8767, US) from the mountains above Etzatlan possess more or less falcate capsules; the flowers however are smaller on longer pedicels and the racemes are more elongate and open.

7. Seymeria falcata B. L. Turner, sp. nov.

S. scabra Gray accedens sed capsulis subfalcatis vel falcatis glabris, calycibus nonglandulosis, laciniis foliorum paucioribus, caulibus glabris vel tantum puberulis.

Annual or short-lived perennial up to 60 cm tall. Stems minutely puberulous in two lines or glabrate, much-branched from a well-developed tap-root. Leaves entire, tri-lobed, multi-lobed to irregularly pinnate, especially below, minutely white-scabrid to glabrate. Flowers yellow or "dull yellow with purplish throat" (Chiang et al. 8919); pedicels 6-10 mm long, glabrous to uncinately-hispid. Calyx 5-6 mm long, decidedly ribbed, glabrous to uncinately-hispid, with 5, linear-lanceolate lobes 3-4 mm long. Corolla somewhat reflexed at maturity, 7-9 mm long, glabrous externally, tube 3-5 mm long; dorsal lobes ciliate, 4-5 mm long, moderately pubescent below just beneath the cleft; lateral lobes ciliate, broadly ovate to oval, 3.5-4.0 mm long; ventral lobes ciliate, ovate to oval, 3-4 mm long. Stamens 4.0-4.5 mm long; filaments 1.5-2.0 mm long, broadened below for ca. 1/2 their length and pubescent with long hairs, the remainder glabrous; anthers glabrous, 2.0-2.5 mm long, opening by terminal poricidal slits for 1/4-5/6 their length. Style slender, 5-7 mm long. Capsule weakly to decidedly falcate, shiny, glabrous, 8-10 mm long; seeds ca. 1 mm long, brownish, pitted, wingless.

TYPE: MEXICO. Coahuila: Head of Canon Ybarra, high central parts of the Sierra del Pino, ca. 2.5 km NW of La Noria, 29 Aug 1941, R. M. Stewart 1256 (holotype GH; isotype TEX).

The species is comprised of two regional intergrading varieties (cf. Fig. 2) as noted below.

Calyces glabrous or nearly so; mid-stem leaves mostly simple to trilobed. var. falcata

Calyces prominently uncinately-hispid; mid-stem leaves mostly pinnate to bipinnate var. uncinata

Seymeria falcata var. falcata.

In addition to the type collection, cited above, the

following specimens may be noted:

Coahuila: SW flank of Sierra del Carmen, 15 Sep 1972, Chiang et al. 9267 (TEX); 9277c (TEX). Western base of Picacho del Fuste, northeasterly from Tanque Vaionetta, 23-25 Aug 1941, Johnston 8356 (GH); SW end of the Sierra del la Fragua, 1-2 km N of Puerto Colorado, 2 Sep 1941, Johnston 8744 (GH, LL); Canon de Ybarra, NW end of Sierra del Pino, 22-23 Sep 1941, Stewart 1801 (GH); vicinity of La Noria, Sierra del Pino. 20-26 Aug 1940, Johnston & Muller 670 (TEX)

Seymeria falcata var uncinata B. L. Turner, var. nov.

A var. falcata calycibus pedicellisque prominente uncinato-hispidis, foliis profusius pinnatisectis differt.

TYPE: MEXICO. Chihuahua: Vicinity of the playas (small shelf-like valleys with meadows), just below the high ridge-crests at the NE end of the Sierra del Diablo, 30 Jul 1941, R. M. Stewart 987 (holotype GH; isotype TEX!, UC!).

Additional Specimens Examined: CHIHUAHUA: Sierra de Chupaderos, ENE of Jimenez, 1750-2145 m, 26 Aug 1972, Chiang et al. 8919 (TEX); 4 km SSW of Cerro cel Gringo, Sierra Diablo, 1800-2050 m, 30 Aug 1972, Chiang et al. 9012 (TEX), COAHUILA: Canon de Hidalgo, Sierra Mojada, above San Salvador Mine, near Esmeralda, "below great cliffs, fairly common on hillside", 4 Aug 1941, Stewart 1055 (GH, TEX).

Seymeria falcata is clearly related to S. scabra and is partially sympatric with that species (Fig. 2). In habit it much resembles the widespread, perennial, S. virgata; indeed, its origins might be from ancestral prototypes of the latter, as suggested by its virgate habit, pubescence of the inner dorsal petals and somewhat deflexed, tubular-companulate flowers. S. falcata is also closely related to S. integrifolia of Jalisco which has relatively small glabrous capsules as does S. falcata, but those of the former are not falcate.

The two varieties are relatively easily distinguished by the key characters given, the var. uncinata having a more southwestern distribution, presumably occurring in somewhat more mesic sites, to judge from label data ("near water in small canyon, fairly common", Stewart 987, TEX). The var. falcata is said to occur in "massive bedded limestone" on steep slopes associated with Agave, Hechtia, Yucca, Vauquelinia, etc. (Chiang et al. 9277c, TEX).

Occasional near intermediates between var falcata and uncinata occur, the most notable being Johnston 8744 (cited under var falcata), which has sparsely uncinately-hispid

calyces and relatively non-pinnatisect leaves. No doubt additional collecting in this poorly known region will reveal yet other intermediates and perhaps occasional hybrids with S. scabra, as noted under the discussion of that taxon.

8. Seymeria laciniata (Mart. & Gal.) Standley
Gerardia laciniata Mart. & Gal., Bull. Acad. Brux. 12: 26. 1845. TYPE: MEXICO. Oaxaca: Mountains of northern Oaxaca, w/o date, H. Galleotti 1070 (holotype, BRLU; isotype K).
Dasytoma laciniata (Mart. & Gal.) Walp., Report. 6: 649. 1847.
Afzelia laciniata (Mart. & Gal.) Pennell, Proc. Acad. Phila. 77: 359. 1925.
 DESCRIPTION: essentially that provided by Pennell (1925).
 DISTRIBUTION AND HABITAT (Fig. 2): Mountainous regions of south-central Mexico from Mexico State, Guerrero and Oaxaca, 950-2600 m, occurring in pine-oak woodlands mostly on or along dry ridges in relatively barren gravelly soils. Flowering: Sep-Dec.
 REPRESENTATIVE SPECIMENS: In addition to those cited by Pennell (1925), all from Oaxaca, the following should be recorded: GUERRERO. Mina: Yesceros. 27 Nov 1939, Hinton et al. 14908 (TEX, US); MEXICO STATE. Temascaltepec: Ocotepc, 12 Oct 1932, Hinton 2915 (GH, US); Cajones, 3 Sep 1933, Hinton 3479 (GH, US).
 The species is readily recognized by its finely dissected nearly glabrous foliage, capsules with nearly sessile glandular trichomes and externally glabrous petals. Corolla size is quite variable, as noted by Pennell in his description, varying from 8-12 mm long.
 Pennell positioned the species among the annual series as the only taxon within his Section Cassioides, subsection Laciniata, largely because of its anthers which dehisce throughout their length. If one ignores the phyletic weight placed on anther dehiscence, S. laciniata is readily positioned in his subsection Scabra next to S. integrifolia.
9. Seymeria scabra Gray, in Torr., Bot. Mex Bound. Surv. 118. 1859. TYPE. TEXAS. Jeff Davis Co.: hillsides along Limpio Creek, (26 Aug 1849), Wright 448. (holotype, GH! isotype UC!)
Afzelia scabra (Gray) Ktze., Rev. Gen. 1:457. 1891.

DESCRIPTION: largely as rendered by Pennell but more recent collections show a greater range in corolla tube length, 2.5-3.0 (4.0) mm, and anther cell length, 2.5-2.8 mm. It should also be noted, that the capsules are often semi-falcate in shape, approaching those of *S. falcata*.

DISTRIBUTION (Fig. 2): North-central Mexico, adjacent Texas and probably southern-most New Mexico, mostly on exposed calcareous and gypseous soils in semi-desert habitats dominated by a wide range of xerophytic shrubs such as *Yucca*, *Dasyllirion*, *Agave*, *Nolina*, *Acacia*, *Eysenhardtia*, etc. Flowering: Aug-Oct.

Since Pennell's study the following significant range extensions should be noted. MEXICO. Nuevo Leon: ca. 15 m SW El Barrial, 1620 m, 24 Sep 1979, Hinton et al. 17653 (TEX) ca. 15 m SW of Galeana, 16 Jul 1934, C. H. & M. T. Mueller 1073 (TEX); same locality, 23 Jul 1934, C. H. & M. T. Mueller 1190 (TEX); ca. 15 airline mi NW of Monterrey, Parque de Portrero on pink gypsum hills, 23 Oct 1970, Turner & Crutchfield 6264 (TEX); ca. 12 mi NW of Galeana, 20 Aug 1979, Turner & Davies A-31 (TEX).

Pennell positioned the species next to *Seymeria madrensis* (*S. integrifolia* in the present treatment) in his subsection *Scabrae*, to which it is undoubtedly related. It is, however, somewhat closer to its sympatric congener, *S. falcata*, newly described above.

Occasional hybridization between *S. scabra* and *S. falcata* must occur upon occasion since they are sympatric, in part, and at least one collection of *S. scabra* (Stewart 2535, GH) possessing nearly glabrate, somewhat falcate capsules, suggests gene flow from *S. falcata*.

10. *Seymeria coahuilana* (Pennell) Standley, Field Mus. Publ. Bot. 11:176. 1936.

Afzelia coahuilana Pennell, Proc. Acad. Phila. 77:366. 1925. TYPE: MEXICO. Coahuila: 21 mi SE of Monclova, Caracol Mts., Aug 1860, E. Palmer 989. (holotype GH!; isotype PH!).

DESCRIPTION: as given by Pennell (1925).

DISTRIBUTION (Fig. 2): Known only by relatively few collections from the area about Monclova where it reportedly occurs in canons and higher montane habitats. Flowering: Jul-Sep.

Representative Specimens: In addition to the several collections made by Palmer between 1860 and

1880 (at various times but all in the vicinity of Monclova and all numbered as 989), a single subsequent collection has been made: Sierra de La Gloria, SE of Monclova, Jul 1939, E. G. Marsh 1910 (GH, TEX).

This taxon is quite similar to Seymeria bipinnatisecta but differs in having glabrous corollas or nearly so (externally) and possessing narrow corolla lobes. In addition the capsule is only very sparsely pubescent with short, glandular trichomes. S. scabra also possesses a glabrous corolla with narrow lobes and a sparsely pubescent capsule. This suggests that S. coahuilana is of hybrid origin from such parentage. If so, however, it is probably of an ancestral nature since Palmers early collections are matched by the Marsh collection of 1939 (cited above) made in or near the type locality. The latter, however, has a few hairs on the corolla tube. So far as known, neither putative parent occurs with S. coahuilana, at least these were not collected by either Palmer or Marsh.

It is also possible that S. coahuilana is nothing more than an isolated populational variant of the widespread S. bipinnatisecta, since nearly glabrous, narrow corolla lobes of the latter occur in western Chihuahua. Sparsely pubescent, but broader, corolla lobes also occur in the higher montane populations of S. bipinnatisecta in southernmost Coahuila. I suspect that the populational variability of S. bipinnatisecta is sufficiently large so as to encompass S. coahuilana; I retain the taxon here out of respect of this ignorance.

11. Seymeria sinaloana (Pennell) Standley, Field Mus. Publ. Bot. 11: 176. 1936.

TYPE. MEXICO. Sinaloa: Cerro Colorado, vicinity of Culiacan, 2 Nov 1904, T. S. Brandegee s. n. (holotype US; isotype UC!; fragment PH!).

DESCRIPTION: essentially that rendered by Pennell (1925).

DISTRIBUTION (Fig. 3): Upper Pacific slopes of the Sierra Madre from southern Sonora and Chihuahua to adjacent Sinaloa, mostly in igneous soils on slopes and ridges in open pine forests from 1000-1600 m. Flowering: Aug-Oct.

REPRESENTATIVE SPECIMENS: MEXICO. Chihuahua: Sierra Canelo, Rio Mayo, 8 Oct 1955, Gentry 2014 (GH, PH, UC); Los Cascarones, Rio Mayo, 11 Sep 1936, Gentry 2664 (GH, UC, US). SINALOA: Cerro de la Sandia, NE of Panuco, 29-30 Aug 1935, Pennell 20080 (GH, US). SONORA: Ridge S of Arroyo Gochico, E of San Bernardo, 1050-1150 m, 5-9 Aug 1935, Pennell 19549 (GH, UC, US); Cerro Saguarivo, E of San Bernardo, 7-8 Aug 1935, Pennell 19581 (UC).

Seymeria sinaloana is a weakly differentiated

peripheral element split out of *S. bipinnatisecta*. It is, however, readily recognized by its small corollas, small anthers and smaller, sparsely pubescent capsules. Pennell, by annotations, identified his Sonoran collections (cited above) as *S. tenuisecta* (19549) and *S. sp. nov.* (19581). The former name was originally applied to individuals with larger corollas and prominently glandular foliar pubescence from southwestern Chihuahua. I include such populations in *S. bipinnatisecta*. However, pubescence glandularity varies considerably in both *S. bipinnatisecta* and *S. sinaloana*, thus Pennell presumably identified most of the Gentry collections (cited above) as *S. chihuahuana* because of their "minutely pubescent to nearly glabrous" leaves, a character used in Pennell's key to species. In short, Pennell was clearly confused as to the specific parameters which characterize *S. sinaloana*, having identified the approximately six collections known to him (all from the same general region; cf. Fig. 3) as four species (*S. chihuahuana*; *S. sinaloana*; *S. tenuisecta*; and *S. sp. nov.*); I include all of these specimens in *S. sinaloana*. Additional field work and experimental studied with the *S. sinaloana* - *S. bipinnatisecta* complex is clearly needed.

12. *Seymeria bipinnatisecta* Seem., Bot. Voy. Herald 323. 1857.

TYPE. MEXICO. Durango [?]: "N.W. of Mexico", Dec 1849 [?], Seemann "2102". (holotype K, according to Pennell, 1925).

Seemann, according to the account of his trip to NW Mexico (Bot. Voy. Herald, pp. 257-261), left Mazatlan in November 1849 on his route to Durango. He most likely collected type material at or near El Salto some 50 km W of Durango city. He did not proceed past the latter locality but rather collected thereafter to the SW of that site, venturing nearly to Tepic before returning to Durango via a somewhat different route, then hence to Mazatlan.

Afzelia bipinnatisecta (Seemann) Ktze., Rev. Gen. 1: 457. 1891.

Afzelia havardii Pennell, Proc. Acad. Nat. Sci. Phila. 72: 507. 1921. TYPE: UNITED STATES. Texas: Maverick Co.: Eagle Pass, 1882, Havard s. n. (holotype, PH!).

Seymeria havardii (Pennell) Standl., Field Mus. Pub. Bot. 11: 175. 1936.

Afzelia chihuahuana Pennell, Proc. Acad. Nat. Sci. Phila. 77: 367. 1925. TYPE: MEXICO. Chihuahua: Cumbre, SW Chihuahua, Oct 1885, Palmer 325. (holotype GH!; isotypes widespread; cf. Pennell, 1925). Probably near Guasarachic (cf. McVaugh, 1956).

Seymeria chihuahuana (Pennell) Standl., Field Mus. Pub. Bot. 11: 175. 1936.

Afzelia glandulosa Pennell, Proc. Acad. Nat. Sci. Phila. 77: 369. 1925. TYPE: MEXICO. Chihuahua: near Chuichupa, 16 Sep 1899, Townsend & Barber 429 (holotype GH!; isotypes widespread; cf. Pennell, 1925).

Seymeria glandulosa (Pennell), Standl. Field Mus. Pub. Bot. 11: 175. 1936.

Afzelia tenuisecta Pennell, Proc. Acad. Nat. Sci. Phila. 77: 370. 1925. TYPE: MEXICO. Chihuahua: base of Mt. Mohinora, 8 mi from Guadalupe y Calvo, 2100-2500 m, 23-31 Aug 1898, E. W. Nelson 4854. (holotype US!).

Seymeria tenuisecta (Pennell) Standl., Field Mus. Pub. Bot. 11: 175. 1936.

DESCRIPTION: About the same as that rendered by Pennell, including the variation for each of the above synonyms. Careful comparisons among these, as well as among the specimens upon which they are based, strongly suggest that only a single widespread specific taxon is involved.

DISTRIBUTION (Fig. 3): Northcentral Mexico from Sonora to Coahuila (where it just crosses the Rio Grande into Texas) and southward into Sinaloa and Durango, occurring in both igneous and calcareous soils from 900 to 2500 m. Flowering: Jul-Dec.

Seymeria bipinnatisecta is a widely distributed, highly variable species. In and about the type locality (El Salto, W of Durango) populations possess somewhat larger, more pinnatisect leaves, larger sepals, longer pedicels and generally shorter, more viscid, glandular trichomes than do the more eastern populations. These characters, however, vary singly and in combination across the range of the species.

Pennell (1925) created, or recognized as species, all four of the synonyms listed above, placing these together (as species 16 through 20) in his key. He distinguished S. bipinnatisecta from S. chihuahuana and S. havardii primarily by the size of capsules (8-9 mm in the former; 9-11 mm in the latter pair). This in spite of his statement that the fruit of S. bipinnatisecta was "not seen mature". In fact, recent collections from near the type locality show that the capsules of S. bipinnatisecta vary from 9-12 mm in length. Pennell distinguished S. bipinnatisecta from both S. glandulosa and S. tenuisecta by the longer pedicels, somewhat larger corollas and larger leaves of the former. But subsequent collections show that these characters vary considerably, both within and between populations.

The most distinct populations of S. bipinnatisecta, as treated here, are perhaps those of northern Coahuila which have longer multiseptate glandular trichomes and somewhat smaller corollas than is typical for the taxon.

These populations mostly occupy relatively xeric, calcareous soils dominated by such genera as Agave, Nolina, Rhus and Juniperus. The name S. havardii has been applied to these populations. However, such populations appear to grade into populations possessing larger corollas and less pronounced trichomes. The latter occur in more montane habitats (Pinus and Abies dominated zones), especially in the Sierra del Carmen of northern Coahuila and in yet other ranges of southern Coahuila. These more montane populations have not received a name but they resemble greatly populations from the igneous regions of western Chihuahua and eastern Durango which have been referred to as either S. tenuisecta or S. glandulosa. Considering the sporadic and seemingly erratic variation found from mountain chain to mountain chain throughout this broad region it makes little sense to attempt an infraspecific classification, at least without more extensive field and experimental studies.

No doubt the small flowered, sparsely pubescent, Seymeria sinaloana, of the Pacific coast slopes of the Sierra Madre is that taxon most closely related to S. bipinnatisecta and could as readily been treated as a varietal or subspecific unit within the latter. I have opted to retain this at the specific level since it is readily distinguished by a combination of floral characters and occupies a relatively distinct geographical region.

Literature Cited

Pennell, F. W. 1925. The genus Azelia: a taxonomic study in evolution. Proc. Acad. Nat. Sci. Phila. 77:335-373.

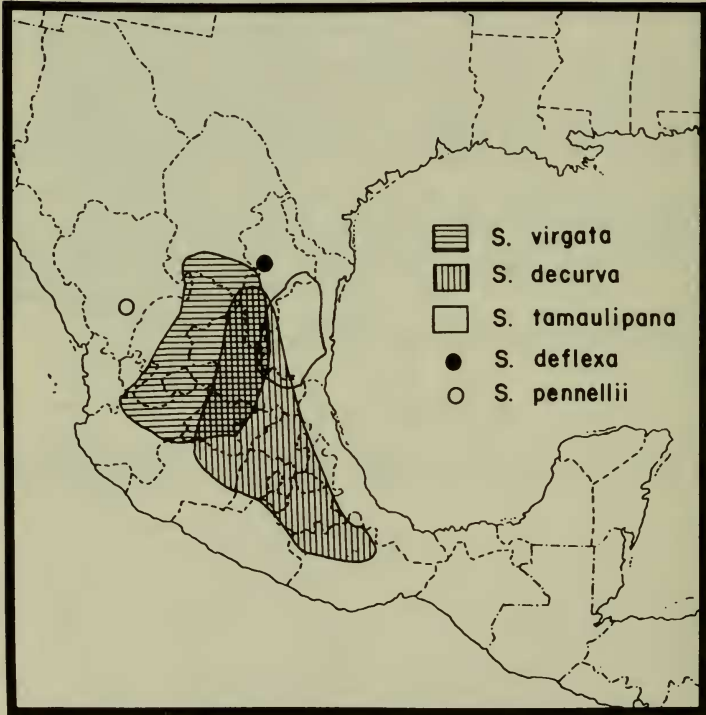


Fig. 1. Distribution of perennial species of Seymeria.

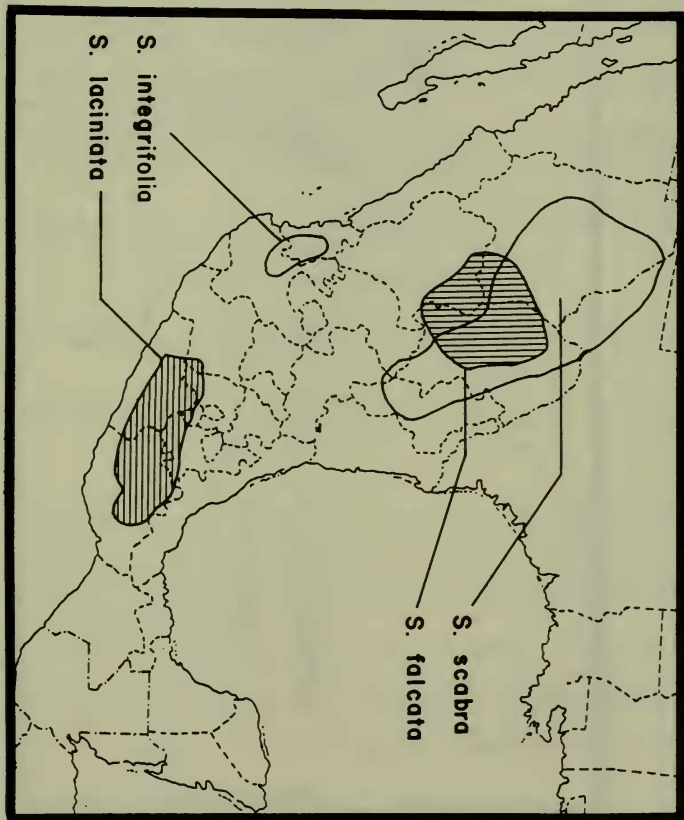


Fig. 2. Distribution of annual species of Mexican Seymeria.

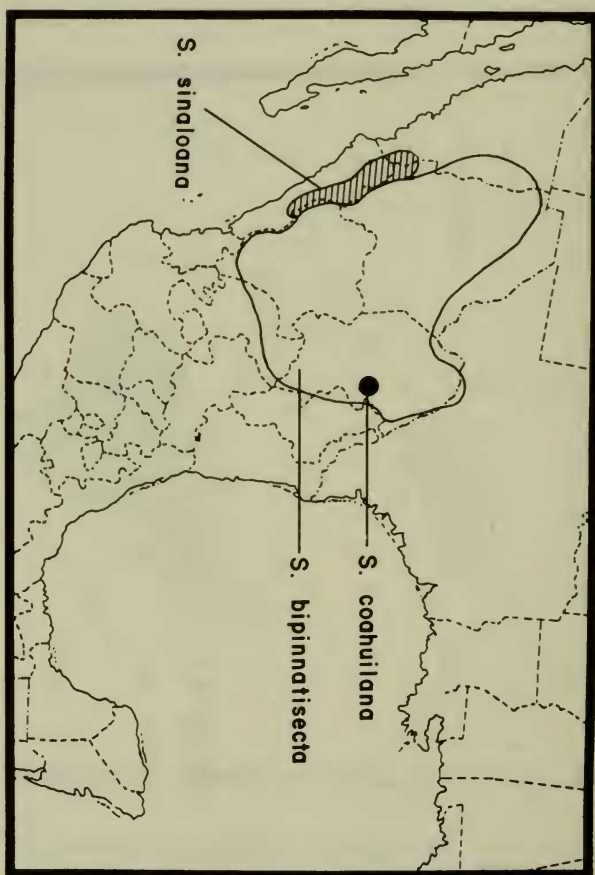


Fig. 3. Distribution of annual species of Mexican Seymeria.